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(54) **Non-linear customer contrast control for a color television with an automatic contrast control**

Nichtlineare Benutzerkontrastregelung für ein Farbfernsehgerät mit automatischer Kontrastregelung

Contrôle non-linéaire de contraste par l'utilisateur pour un poste de télévision en couleur disposant d'un contrôle automatique de contraste

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## Description

### Field of the invention

[0001] This invention relates to a method for controlling the contrast of a television receiver or monitor and, in particular, for extending the range of customer contrast control of a television receiver, or monitor, having automatic contrast control capability. In modern television systems it is known to automatically control the contrast and brightness of a reproduced image. For example, a TV system with automatic contrast control to inhibit "white spot blooming" is described in USP 5,003,394 entitled DYNAMIC VIDEO SYSTEM INCLUDING AUTOMATIC CONTRAST AND "WHITE STRETCH" PROCESSING SECTIONS. Automatic contrast control (which is also referred to as "autopix" where "pix" is an abbreviation for "picture") prevents loss of detail sharpness in highlight (white) areas due to blooming, while permitting high contrast (and therefore subjectively bright) images when the signal peaks remain below the blooming threshold.

### Description of the prior art

[0002] In known TV systems with automatic contrast control circuitry, main and auxiliary video inputs 1 and 3, respectively, coupled to a picture-in-picture (PIP) processor 5 which is also controlled by a receiver control 7. PIP processor 5 provides signals (C and Y) to luminance circuit 9 and to chrominance circuit 11. The outputs of luminance and chrominance circuits 9 and 11, respectively, are applied to a matrix 10 whose outputs are red (r), blue (b), and green (g) color signals which are applied to respective inputs of al contrast control section 13r, 13b, and 13g. The contrast control section (e.g., 13r, 13b and 13b) is responsive to the red (r), blue (b) and green (g) color signals and its outputs are applied to a brightness control section (e.g., 15r, 15b and 15g) whose outputs are coupled via drivers (e.g., 17r, 17b and 17g) to a picture tube (e.g. 19).

[0003] The known automatic contrast control arrangement includes a combiner circuit 47 for deriving a "combined" signal (e.g., SUMY from the outputs of the brightness section.

[0004] The combined signal (i.e., SUMY) as used herein and in the claims appended hereto is representative of the luminance component of the displayed image. The combined signal (SUMY) is then processed via an autopix circuit 41 comprised of a peak detector 49 and a comparator 50 whose output is fed back via a buffer 51 to the control input terminal 13 of the contrast control section (13r, 13b, 13g) of the TV system. The autopix loop 41 comprising peak detector 49, comparator 50, and buffer 51 defines a feedback loop coupled between the output (terminal 14) of the combiner circuit 47 and the input control (terminal 13) of the contrast control section which determines the closed loop gain of the contrast control section. The open loop gain of the contrast control section (13r, 13g and 13b) is determined, in part, by a customer contrast control unit 60 which is driven by receiver control 7.

[0005] Contrast control unit 60 includes a common control microprocessor 63, a buffer amplifier 65 and a low pass filter 67. The microprocessor 63 is used to control various functions such as peaking, contrast and brightness. Under the control of microprocessor 63 and a switching element N63, a pulse signal (PS) and its logical complement PSN are generated. The pulse signals PS and PSN include pulses which are pulse width modulated (PWM) to represent the customer's contrast control settings, also defined and referred to herein as customer control steps. The signal PSN (which is the logical complement of PS) is produced at node 29 of microprocessor 63 and is applied to the input of the buffer amplifier 65.

[0006] Amplifier 65 is responsive to the pulse width modulated pulse signal (PSN) and produces at its output node 75 amplified and buffered pulse width modulated output pulses (in phase with the PS signal) which are then applied to the input of a low pass filter 67. Filter 67 represented by a series connected resistor R7 and a shunt connected capacitor C1, filters the pulse width modulated signals produced by amplifier 65 to produce a DC user contrast control voltage (Vc) at node 670 which is applied to terminal. 13.

[0007] In the known arrangement, an automatic beam current limiter 52 is also coupled to terminal 13. Consequently, capacitor C1 of low pass filter 67 is shared by circuits 60, 52 and 41 to filter and store the respective control voltages generated by user contrast consol unit 60, automatic beam current limiter 52 and automatic contrast control unit 41. The control voltage (Vc) developed across capacitor C1 is thus a combination of the individual control voltages generated by control units 60, 52 and 41.

[0008] In the known arrangement, it is assumed that increasing the direct current (DC) contrast control voltage (Vc) corresponds to increasing gain, and therefore increasing contrast, and that decreasing the DC contrast control voltage (Vc) corresponds to decreasing gain and contrast. This corresponds to the further assumption that white going portions of the processed luminance output signal (SUMY) are positive going.

[0009] In the known arrangement, automatic contrast control unit (autopix) 41 includes a peak detector 49 which detects the peaks of the white going portion of the processed luminance output signal SUMY. The output voltage of white peak detector 49 is coupled to comparator 50. Peak detector 49 and comparator 50 are arranged to decrease the contrast control voltage as a function of the peak amplitude of the luminance output signal when the peak exceeds a predetermined reference voltage.

[0010] A problem with the known TV system is that, for some signals, the autopix feedback loop limits the

range over which the contrast control may vary. A drawback of this limitation is that since autopix is a relatively new feature, a customer/user trying to adjust the contrast may believe the TV set is defective because the contrast cannot be made to vary in the accustomed manner.

[0011] The extent of the limitation may be better appreciated by understanding that in an exemplary arrangement, there are 63 control steps (or settings) available to the customer/user to increase (going from step zero to step 63) the contrast.

[0012] In the exemplary arrangement, the VIDEO output varies linearly in response to the customers control steps in the range from zero to 21. However, for customer control steps above 21, the response is flat. That is, the operation of the autopix feedback loop limits the users ability to alter the contrast above control step 22 with the video output voltage being held constant. Thus, for example, in a system which theoretically provides for 63 control steps, only the first 21 may be effectively used.

## Summary of the invention

[0013] Applicants' invention resides, in part, in the recognition of the problem discussed above and, in part, in the method for controlling the circuitry to extend the range over which the customer can exercise contrast control.

[0014] In TV systems embodying the invention, user responsive contrast control voltage generating circuitry is intentionally rendered nonlinear to produce a nonlinear control voltage which is applied to the contrast control section in a manner to extend the range over which the user can control the contrast of the TV receiver.

[0015] In a particular embodiment, the TV system includes a contrast control section and a brightness control section with each one of the contrast and brightness control sections having inputs and outputs and with the outputs of the contrast control section being coupled to the inputs of the brightness control section. Color signals are applied to the inputs of the contrast control section for processing the color signals via the contrast and brightness control sections. The outputs of the brightness control section are combined for producing a combined signal. A feedback loop (autopix) responsive to the combined signal is coupled between the outputs of the brightness control section and the inputs of the contrast control section. The feedback loop functions to limit the range over which the contrast can vary. User responsive contrast control voltage circuitry is coupled to the input of the contrast control section and applies to it a contrast control voltage which is a nonlinear function of the customer control signals for extending the range over which the user can vary the contrast.

## Description of the preferred embodiments

[0016] The present invention includes a user contrast control voltage generating circuit embodying the invention and, in particular, to an amplifier/filter 81 which may be substituted for the buffer amplifier 65 of the prior art arrangement.

[0017] A pulse width modulated customer contrast control pulse signal (PS) is applied to the gate of a switch N63 for controlling its turn-on and turn-off and the logical complement signal (PSN) is generated at output terminal 29 of microprocessor 63 which is connected via a pull-up resistor Rl to a source of +5 volts. PSN is applied via resistor R2 to the base of an NPN bipolar transistor Q1 whose emitter is grounded. A resistor R4 is connected between the collector of Q1, and a node 71 and a resistor R3 is connected between node 71 and a power terminal 17 to which is applied Vcc volts which may be, for example, a positive 12 volts.

[0018] A nonlinear low pass filter 73 is connected between node 71 and the base of an NPN bipolar transistor Q2 operated as an emitter follower. The filter 73 includes a resistor R8 connected between node 71 and the base of Q2, a diode D1 having its cathode connected to node 71 and its anode connected to the base of Q2. and a capacitor C2 connected between the base of Q2 and ground.

[0019] The collector of Q2 is connected to terminal 17 and its emitter is connected to an output node 75. A ground return emitter resistor R5 is connected between node 75 and ground. A low pass filter 671 which may be of the same type as filter 67 of the prior art arrangement is connected between node 75 and contrast control terminal 13 of the RGB IC. As in the prior art arrangement, a resistor R7 is connected between node 75 and contrast control terminal 13 and a filter capacitor C1 is connected between terminal 13 and ground. As in the prior art arrangement, an output of the autopix network 41 and an output of the beam limiter circuit 52 are connected back to terminal 13.

[0020] Referring to network 73 according to the present invention, the combination of R8, D1 and C2 functions to produce a non-linear direct current (DC) contrast control voltage (Vc). In the circuit, capacitor C2 is isolated from C1 (and terminal 23), whereby C2 can be charged and/or discharged at different rates. When Q1 is fully turned-off, C2 is charged by the series combination of R3 and R8. When Q1 is turned-on, C2 discharges via D1 (poled to conduct in the forward direction) which shunts R8, and the parallel combination of R3 and R4. Therefore, the charging time constant (Tc) is approximately (R3+R8)(C2) while the discharge time constant (Td) is approximately (R3 in parallel with R4) multiplied by (C2). For R3 = 1.8K ohms, R8 = 10 K ohms, and R4 = 4.7K ohms, the series resistance of R3 + R8 is approximately 12K ohms and the parallel combination of R3 and R4 is approximately 1.3K ohms. Consequently, it is evident that the charging time constant (Tc) is more than nine (9) times greater than the discharge time constant (Td).

[0021] To better understand the role played by filter

73, note that in the circuit according to the present invention (as in the known circuit described above) the user can vary (increase or decrease) the contrast in 63 steps. The user's control is manifested by the production of a pulse width modulated pulse signal (PS). The PSN signals produced at terminal 29 of the microprocessor are the logical complement of the PS signals and are applied to the input of the buffer amplifier 81. The period (Tp) of the pulse signal may be divided into 64 steps (63 increments). The first step is a zero dc voltage level to ensure the full turn-off of N63 and the 64th step is a direct current (dc) level of sufficient amplitude to ensure that N63 is fully turned-on. The pulse period Tp is divided into 63 equal increments with each succeeding higher step having a pulse width which is greater than the lower previous step by Tp/63. Thus, the "high" level pulse width (TH) duration of any step (Ni) between step 1 and step 63, may be expressed as (Ni/63)(Tp); where Tp is the pulse width duration which is equal to TH plus TL where TH is the length of time the pulse is high and TL is the length of time the pulse is low. Varying the length of time a pulse is high (e.g., TH) versus the pulse duration (Tp) is a means of varying the duty cycle, i.e. (TH/Tp)(100%) of the pulse train applied to the amplifier/filter combination. As further detailed below, the direct current (d.c.) level of the contrast control voltage is varied by varying the duty cycle of the pulse train.

**[0022]** For ease of explanation, we shall first examine the response of the circuit according to the present invention for two end point conditions. In the discussion to follow, it is assumed that when PS is "low" or "O", PSN is "high" and of sufficient amplitude to fully turn-on Q1 and that when PS is "high" or logic "1" PSN is "low" or "O" and of such an amplitude to fully turn-off Q1.

1. First, at step 0, PS is "low" or "0", PSN is "high" and Q1 is on hard. For this condition, the voltage divider network of R3 and R4 causes the voltage at node 71 to be approximately equal to 8.6 volts. The base of Q2 will be less than, but close to, that voltage and the voltage at the emitter of Q2 (node 75) will be approximately 0.7 volt below the Q2 base voltage. This condition defines the minimum voltage produced at the emitter of Q2 and the minimum voltage (Vc) produced at output node 670 and applied to terminal 13 which is approximately equal to 7.9 volts.

2. At step 63, PS is at a "high" dc level and PSN is at a "low" level whereby Q1 is fully turned-off, Since Q1 is nonconducting, the base of Q2 is coupled via the series combination of R3 and R8 to Vcc volts. Due to the emitter follower action of Q2, the voltage drop across R3 and R8 will be relatively small, being a function of the base current into Q2. For Vcc equal to 12 volts, the voltage drop across R3 and R8 may be assumed to be approximately 0.4 volt, whereby the voltage at the base of Q2 is approximately 11.6 volts. Assuming a VBE drop of approximately 0.7 volt, the voltage (V4) at the emitter of Q2 is then approximately 10.9 volts. Thus the maximum voltage (VMAX or VCMAX) produced at the emitter of Q2 and hence at node 670 and applied to terminal 13, is approximately 10.9 volts, while the minimum voltage (VMIN or VcMIN) is approximately 7.9 volts. Consequently, the customer control steps may be used to vary the dc contrast control voltage (Vc) between a minimum value (e.g., 7.9 volts) and a maximum value (e.g., 10.9 volts). As noted above, it is assumed that increasing the direct current (DC) contrast control voltage (Vc) corresponds to increasing gain, and therefore increasing contrast, and that decreasing the DC contrast control voltage (Vc) corresponds to decreasing gain and contrast. Also, in contrast to the known circuit described above, in circuits embodying the invention, the dc contrast control (Ve) is not increased (decreased) linearly as a function of increasing (decreasing) steps (settings).

**[0023]** In the prior art circuit, the amplifier 65 functions to charge capacitor C1 with a charging time constant (Tc) which is nearly equal to the discharging time constant (Td). As a result, in the known circuit the pulse signal causes the contrast control voltage produced at the emitter of Q2 and across capacitor C1 to increase linearly as the control settings are increased from 0 to 63.

**[0024]** Note that in the known circuit for the open loop condition (when the output of autopix 41 is not connected to node 13) the contrast control voltage Vc, rises linearly from a VcMIN value of approximately 7.9 volts dc for the zero customer control step (setting) to a value of approximately 1 1.4 volts dc at the 63rd customer control step.

**[0025]** Referring back to the circuit according to the present invention, recall that in network 73 the charging time constant (Tc) is made much greater than the discharge time constant (Td). Consequently, the open loop dc voltage produced at the emitter of Q2 (node 75) and at node 670 tends to increase slowly for the low values of customer control steps (settings) where the pulse width of the pulse signal is small and to increase more quickly for the higher valued customer control settings where the pulse width of the pulse signal is larger. Therefore, by making the charging time constant greater than the discharging time constant (TC > Td) the contrast control voltage (Vc) produced at the output of the filter 671 and applied to terminal 13 of the contrast control section tends to be less than the value of Vc produced when Tc is approximately equal to Td.

**[0026]** The smaller increments of control voltage (Vc) for the lower valued contro steps generated by the circuit according to the present invention (as compared to the known circuit) effectively reduces the drive and the gain of the contrast control section 13b, 13g, 13r for the lower valued customer control steps.

[0027] In the known circuit, the control voltage increases linearly from step 0 to step 21 and then remains flat over the rest of the customer control settings (steps 21-63). With the amplifier/filter according to the present invention connected in circuit, the control voltage varies over a range extending from step 0 to step 42. Thus, the contrast control voltage is now responsive to customer control steps over a range which extends from step 0 to at least step 42.

[0028] As discussed above, for the known combination of amplifier 65 and filter 67, the customer control is limited to the first 21 steps (settings). In contrast, for the amplifier/filter 81 of the invention in combination with filter 67 customer control exists over a range extending from step 0 to step 42. Consequently, in circuits and systems embodying the invention, the luminance is made to be controlled over a range of 42 customer control steps, whereby the contrast control has been expanded over a much wider range than that available with the known linear contrast control circuit.

[0029] According to the present invention the non-linearization of the contrast control voltage (Vc) was achieved by inserting a network 81 comprised of an amplifier and non-linear low pass filter. It should be appreciated that a similar result could be obtained by non-linearizing the pulse width of the pulse signal as a function of customer control steps and applying the "non-linearized" pulse width signals to a linear amplifier filter combination.

[0030] In the circuit according to the present invention, the duty cycle of the pulse train is varied by using pulse width modulation. However, it should be appreciated that the duty cycle of the pulse train may be varied by using a bit rate multiplier scheme or other known arrangement. In all instances, the teaching of the invention is the production of a direct current (d.c.) contrast control voltage (Vc) which is a non-linear function of the duty cycle of the pulse train.

## Claims

1. A television receiver comprising a video signal processing system, the video signal processing system comprising:

   a contrast control section coupled to a source of video signals and controlling a contrast parameter of the video signals in response to a contrast control signal;
   a brightness control section having an input coupled to the contrast control section and an output for providing processed video signals;
   a peak detector having an input coupled to the output of the brightness control section and an output coupled to the contrast control section, the peak detector detecting peak video signal levels that exceed a threshold level and providing a first control signal in response to the detected peak signal levels; and
   a user contrast control unit coupled to the contrast control section, the user contrast control unit providing a second control signal, the contrast control signal being generated in response to the first and second control signals,

   **characterized in that** the second control signal is a non-linear function of an user contrast input, wherein the non-linear second control signal extends the range over which the user can vary the contrast of the processed video signals.

2. The television receiver of Claim 1, further **characterized in that** said user contrast control unit includes a low pass filter whose charging time constant is not equal to its discharging time constant.

3. The television receiver of Claim 2, further **characterized in that** the charging time constant is greater than the discharging time constant.

4. The television receiver of Claim 2, further **characterized in that** the user contrast control unit includes a first amplifier having an input for receiving a user generated contrast control signal and having an output, a second amplifier having an input and an output, wherein the low pass filter is connected between the output of the first amplifier and the input of the second amplifier.

5. The television receiver of Claim 4, further **characterized in that** the low pass filter includes an RC network.

6. The television receiver of Claim 5, further **characterized in that** the RC network includes a resistor and a capacitor and a diode connected across at least part of the resistor whereby the diode functions as a relatively low impedance shunt for one polarity of signals.

7. The television receiver of Claim 1, further **characterized in that** the user contrast control unit generates the second control signal in response to a control signal that includes pulse width modulated rectangular pulses whose duty cycle is defined as TH/TP, wherein TH is the length of time the pulse is relatively positive, TL is the length of time the pulse is relatively negative, and TP is equal to TH plus TL, and wherein the amplitude of the control voltage is a non-linear function of TH/TP.

8. A method for controlling a contrast parameter in a video signal processing system of a television receiver, comprising the steps of:

receiving video signals from a source of video signals; processing the received video signals in a contrast control section in response to a contrast control signal, and then in a brightness control section;
detecting peak video signal levels that exceed a threshold level from an output of the brightness control section and providing a first control signal to the contrast control section in response to the detected peak signal levels, and providing a second control signal to the contrast control section in response to a user contrast input, the contrast control signal being generated in response to the first and second contrast control signals, **characterized in that** the second control signal is a non-linear function of the user contrast input, wherein the non-linear second control signal extends the range over which the user can vary the contrast of the processed video signals.

9. The method according to claim 8, further **characterized in that** the second control signal is generated using a low pass filter whose charging time constant is not equal to its discharging time constant.

10. The method according to claim 9, further **characterized in that** the charging time constant is greater than the discharging time constant.

11. The method according to claim 9, further **characterized in that** the second control signal is generated using a first amplifier having an input for receiving a user generated contrast control signal and having an output, a second amplifier having an input and an output, wherein the low pass filter is connected between the output of the first amplifier and the input of the second amplifier.

12. The method according to claim 8, further **characterized in that** second control signal is generated in response to a control signal that includes pulse width modulated rectangular pulses whose duty cycle is defined as TH/TP, wherein TH is the length of time the pulse is relatively positive, TL is the length of time the pulse is relatively negative, and TP is equal to TH plus TL, and wherein the amplitude of the control voltage is a non-linear function of TH/TP

## Patentansprüche

1. Fernsehempfänger mit einem Videosignal-Verarbeitungssystem, wobei das Videosignal-Verarbeitungssystem folgende Merkmale aufweist:

   einen Kontrasteinstellbereich, der mit einer Quelle von Videosignalen verbunden ist und einen Kontrastparameter der Videosignale in Abhängigkeit von einem Kontrasteinstellsignal steuert,
   einen Helligkeits-Einstellbereich mit einem mit dem Kontrasteinstellbereich verbundenen Eingang und einem Ausgang zur Lieferung von verarbeiteten Videosignalen,
   einen Spitzendetektor mit einem Eingang, der mit dem Ausgang des Helligkeits-Einstellbereichs verbunden ist, und einem Ausgang, der mit dem Kontrasteinstellbereich verbunden ist, wobei der Spitzendetektor Spitzenwerte des Videosignals detektiert, die einen Schwellwert übersteigen, und ein erstes Einstellsignal in Abhängigkeit von den detektierten Spitzensignalwerten liefert, und
   eine mit dem Kontrasteinstellbereich verbundene Benutzer-Kontrasteinstelleinheit, wobei die Benutzer-Kontrasteinstelleinheit ein zweites Einstellsignal liefert und das Kontrasteinstellsignal aufgrund des ersten und zweiten Einstellsignals erzeugt wird,

   **dadurch gekennzeichnet, daß**
   das zweite Einstellsignal eine nichtlineare Funktion einer Benutzer-Kontrasteingabe ist und das nichtlineare zweite Einstellsignal den Bereich übersteigt, über den der Benutzer den Kontrast der verarbeiteten Videosignale ändern kann.

2. Fernsehempfänger nach Anspruch 1, **dadurch gekennzeichnet, daß** die Benutzer-Kontrasteinstelleinheit ein Tiefpaßfilter enthält, dessen Ladezeitkonstante nicht gleich seiner Entladezeitkonstanten ist.

3. Fernsehempfänger nach Anspruch 2, **dadurch gekennzeichnet, daß** die Ladezeitkonstante größer als die Entladezeitkonstante ist.

4. Fernsehempfänger nach Anspruch 2, **dadurch gekennzeichnet, daß** die Benutzer-Kontrasteinstelleinheit einen ersten Verstärker mit einem Eingang zum Empfang eines vom Benutzer erzeugten Kontrasteinstellsignals und mit einem Ausgang und einen zweiten Verstärker mit einem Eingang und einem Ausgang enthält und das Tiefpaßfilter zwischen dem Ausgang des ersten Verstärkers und dem Eingang des zweiten Verstärkers liegt.

5. Fernsehempfänger nach Anspruch 4, **dadurch gekennzeichnet, daß** das Tiefpaßfilter ein RC-Netzwerk enthält.

6. Fernsehempfänger nach Anspruch 5, **dadurch gekennzeichnet, daß** das RC-Netzwerk einen Widerstand und einen Kondensator und eine über wenig-

stens einem Teil des Widerstands liegende Diode enthält, wodurch die Diode als eine relativ niedrige Parallelimpedanz für eine Polarität der Signale wirkt.

7. Fernsehempfänger nach Anspruch 1, **dadurch gekennzeichnet, daß** die Benutzer-Kontrasteinstelleinheit das zweite Einstellsignal in Abhängigkeit von einem Einstellsignal erzeugt, das impulsbreitenmodulierte Rechteckimpulse enthält, deren Tastverhältnis durch TH/TP bestimmt ist, wobei TH die Zeitdauer ist, wo der Impuls relativ positiv ist, TL die Zeitdauer ist, wo der Impuls relativ negativ ist, und TP gleich TH plus TL ist und wobei die Amplitude der Einstellspannung eine nichtlineare Funktion von TH/TP ist.

8. Verfahren zur Einstellung eines Kontrastparameters in einem Videosignal-Verarbeitungssystem eines Fernsehempfängers mit folgenden Schritten:

   Empfang von Videosignalen von einer Videosignalquelle, Verarbeitung der empfangenen Videosignale in einem Kontrasteinstellbereich in Abhängigkeit von einem Kontrasteinstellsignal und dann in einem Helligkeitseinstellbereich,
   Detektieren der Spitzenwerte des Videosignals, die einen Schwellwert übersteigen, von einem Ausgang des Helligkeitseinstellbereichs und Liefern eines ersten Einstellsignals zu dem Kontrasteinstellbereich in Abhängigkeit von den detektierten Signal-Spitzenwerten und
   Liefern eines zweiten Einstellsignals zu dem Kontrasteinstellbereich in Abhängigkeit von einer Benutzer-Kontrasteingabe,
   wobei das Kontrasteinstellsignal aufgrund des ersten und des zweiten Kontrasteinstellsignals erzeugt wird,

   **dadurch gekennzeichnet, daß**
   das zweite Einstellsignal eine nichtlineare Funktion der Benutzer-Kontrasteingabe ist und das nichtlineare zweite Einstellsignal den Bereich ausdehnt, über den der Benutzer den Kontrast der verarbeiteten Videosignale ändern kann.

9. Verfahren nach Anspruch 8, **dadurch gekennzeichnet, daß** das zweite Steuersignal durch Anwendung eines Tiefpaßfilters erzeugt wird, dessen Ladezeitkonstante nicht gleich seiner Entladezeitkonstante ist.

10. Verfahren nach Anspruch 9, **dadurch gekennzeichnet, daß** die Ladezeitkonstante größer als die Entladezeitkonstante ist.

11. Verfahren nach Anspruch 9, **dadurch gekennzeichnet, daß** das zweite Einstellsignal durch Anwendung eines ersten Verstärkers mit einem Eingang zum Empfangen eines vom Benutzer erzeugten Kontrasteinstellsignals und mit einem Ausgang, eines zweiten Verstärkers mit einem Eingang und einem Ausgang erzeugt wird,
    und das Tiefpaßfilter zwischen dem Ausgang des ersten Verstärkers und dem Eingang des zweiten Verstärkers liegt.

12. Verfahren nach Anspruch 8, **dadurch gekennzeichnet, daß** das zweite Einstellsignal in Abhängigkeit von einem Einstellsignal erzeugt wird, das impulsbreitenmodulierte Rechteckimpulse enthält, deren Tastverhältnis durch TH/TP bestimmt ist, wobei TH die Zeitdauer ist, wo der Impuls relativ positiv ist, TL die Zeitdauer ist, wo der Impuls relativ negativ ist, und TP gleich TH plus TL ist und wobei die Amplitude des Einstellsignals eine nichtlineare Funktion von TH/TP ist.

**Revendications**

1. Récepteur de télévision comprenant un système de traitement de signaux vidéo, le système de traitement de signaux vidéo comprenant :

   une section de commande de contraste couplée à une source de signaux vidéo et commandant un paramètre de contraste des signaux vidéo en réponse à un signal de commande de contraste ;
   une section de commande de brillance ayant une entrée couplée à la section de commande de contraste et une sortie pour fournir des signaux vidéo traités ;
   un détecteur de pics ayant une entrée couplée à la sortie de la section de commande de brillance et une sortie couplée à la section de commande de contraste, le détecteur de pics détectant des niveaux maximum de signaux vidéo qui dépassent un niveau de seuil et fournissant un premier signal de commande en réponse aux niveaux maximum de signaux détectés ; et une unité de commande de contraste par l'utilisateur couplée à la section de commande de contraste, l'unité de commande de contraste par l'utilisateur fournissant un deuxième signal de commande, le signal de commande de contraste étant généré en réponse aux premier et deuxième signaux de commande,

   **caractérisé en ce que** le deuxième signal de commande est une fonction non linéaire d'une entrée de contraste par l'utilisateur, dans lequel le deuxième signal de commande non linéaire étend la gamme sur laquelle l'utilisateur peut faire varier

le contraste des signaux vidéo traités.

2. Récepteur de télévision selon la revendication 1, **caractérisé en outre en ce que** ladite unité de commande de contraste par l'utilisateur comporte un filtre passe-bas dont la constante de temps de charge n'est pas égale à sa constante de temps de décharge.

3. Récepteur de télévision selon la revendication 2, **caractérisé en outre en ce que** la constante de temps de charge est supérieure à la constante de temps de décharge.

4. Récepteur de télévision selon la revendication 2, **caractérisé en outre en ce que** l'unité de commande de contraste par l'utilisateur comporte un premier amplificateur ayant une entrée pour recevoir un signal de commande de contraste généré par l'utilisateur et ayant une sortie, un deuxième amplificateur ayant une entrée et une sortie, dans lequel le filtre passe-bas est connecté entre la sortie du premier amplificateur et l'entrée du deuxième amplificateur.

5. Récepteur de télévision selon la revendication 4, **caractérisé en outre en ce que** le filtre passe-bas comporte un réseau RC.

6. Récepteur de télévision selon la revendication 5, **caractérisé en outre en ce que** le réseau RC comporte une résistance et un condensateur et une diode connectée aux bornes d'au moins une partie de la résistance si bien que la diode fonctionne comme un shunt d'impédance relativement basse pour une polarité des signaux.

7. Récepteur de télévision selon la revendication 1, **caractérisé en outre en ce que** l'unité de commande de contraste par l'utilisateur génère le deuxième signal de commande en réponse à un signal de commande qui comporte des impulsions rectangulaires modulées en largeur d'impulsion dont le facteur de service est défini par TH/TP, dans lequel TH est la durée pendant laquelle l'impulsion est relativement positive, TL est la durée pendant laquelle l'impulsion est relativement négative, et TP est égal à TH plus TL, et dans lequel l'amplitude de la tension de commande est une fonction non linéaire de TH/TP.

8. Procédé pour commander un paramètre de contraste dans un système de traitement de signaux vidéo d'un récepteur de télévision, comprenant les étapes de :

   réception de signaux vidéo depuis une source de signaux vidéo ;

   traitement des signaux vidéo reçus dans une section de commande de contraste en réponse à un signal de commande de contraste, puis dans une section de commande de brillance ;

   détection de niveaux maximum de signaux vidéo qui dépassent un niveau de seuil provenant d'une sortie de la section de commande de brillance et fourniture d'un premier signal de commande à la section de commande de contraste en réponse aux niveaux maximum de signaux vidéo détectés ; et

   fourniture d'un deuxième signal de commande à la section de commande de contraste en réponse à une entrée de contraste par l'utilisateur, le signal de commande de contraste étant généré en réponse aux premier et deuxième signaux de commande de contraste, **caractérisé en ce que** le deuxième signal de commande est une fonction non linéaire de l'entrée de contraste par l'utilisateur, dans lequel le deuxième signal étend la gamme sur laquelle l'utilisateur peut faire varier le contraste des signaux vidéo traités.

9. Procédé selon la revendication 8, **caractérisé en outre en ce que** le deuxième signal de commande est généré en utilisant un filtre passe-bas dont la constante de temps de charge n'est pas égale à sa constante de temps de décharge.

10. Procédé selon la revendication 9, **caractérisé en outre en ce que** la constante de temps de charge est supérieure à la constante de temps de décharge.

11. Procédé selon la revendication 9, **caractérisé en outre en ce que** le deuxième signal de commande est généré en utilisant un premier amplificateur ayant une entrée pour recevoir un signal de commande de contraste généré par l'utilisateur et ayant une sortie, un deuxième amplificateur ayant une entrée et une sortie, dans lequel le filtre passe-bas est connecté entre la sortie du premier amplificateur et l'entrée du deuxième amplificateur.

12. Procédé selon la revendication 8, **caractérisé en outre en ce que** le deuxième signal de commande est généré en réponse à un signal de commande qui comporte des impulsions rectangulaires modulées en largeur d'impulsion dont le facteur de service est défini par TH/TP, dans lequel TH est la durée pendant laquelle l'impulsion est relativement positive, TL est la durée pendant laquelle l'impulsion est relativement négative, et TP est égal à TH plus TL, et dans lequel l'amplitude de la tension de commande est une fonction non linéaire de TH/TP.